

AN
INAUGURAL ESSAY
ON THE SURGERY OF THE
DISLOCATED SHOULDER JOINT;
Submitted to the consideration
OF
THE HON. ROBERT SMITH, PROVOST,
And of the Regents and Medical Professors
Of the University of Maryland,
FOR THE DEGREE OF DOCTOR OF MEDICINE.

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Omnes, eodem, cogimur....*Horace.*

"De hoc multi multa, omnis aliquid, nemo satis."

Non enim tam Auctoritatis in disputando, quam rationis momenta quaerenda sunt.
Cicero.

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TO DOCTOR WILLIAM H. CLENDINEN,

OF BALTIMORE:

*Under whose direction I have pursued and closed my
Medical Studies;*

To the kind acts of whom, I owe my very existence as a professional character.

To you, sir, I should be unjust, were I not thus publickly to acknowledge my gratitude for the numerous favours which have been bestowed upon me, while resident with you, by yourself and amiable companion: as well as the unremitting care and pains you have taken to facilitate my search, and enlarge my capacities.

Allow me, then, to dedicate to you the first fruits of my youthful pen, as a trifling tribute of respect and esteem for your liberality. Not that in having done so, the obligations I am under shall be obliterated; but that I gladly seize the favourable opportunity of making known to you how sensibly I feel them, and the sincere wishes for your future health and happiness of

Your affectionate brother and pupil,

THE AUTHOR.

TO

THE MEDICAL PROFESSORS

IN THE

University of Maryland,

THIS DISSERTATION IS INSCRIBED,

As a trifling memento of respect and esteem, for the politeness with which they have always honoured

their friend and pupil,

THE AUTHOR.

TO THE
BALTIMORE MEDICAL SOCIETY,

This essay

IS INSCRIBED,

AS A FEEBLE TRIBUTE OF ESTEEM

For the improvement I have derived from their discussions;
and the honours which they have been pleased

To confer on

THE AUTHOR.

**"Where calm *retirement's* sacred pleasures move,
The hour contemplative, or friend they love;**

* * * * *

**Tho' noisy pride may scorn her silent toil,
Fair are the fruits which bless her happy soil;
There every plant of useful produce grows,
There *science* springs, and there *instruction* flows:
There true *phylosophy* erects her school,
There plans her problems, and there forms her
rule;
There every seed of every heart began,
And all that eases life and brightens man."**

Zimmerman.

**"In every human heart there lies reclin'd
Some atom pregnant with ethereal mind;
Some plastick power, some intellectual ray,
Some genial sun-beams from the source of day;
Something that warms, and, restless to aspire,
Wakes the young heart, and sets the soul on fire."**

PRELIMINARY OBSERVATIONS.

NATURE, who is provident in all her works, has conferred a portion of her riches and wisdom, on the articulation of the os brachii with the scapula.

As man stands preeminent in the scale of animated creation, we see him possessing appropriate organs to enable him to move in the sphere in which he is placed: we see him possessed of a figure that stands erect; a countenance that looks to the heavens; a voice to utter what the mind contemplates, &c. &c.

To search into the economy of nature, is a pursuit which will richly reward even the naturalist, for we every where see traces of her wisdom and handy work. But it seems that there is no occasion on which a desire of knowledge, a willing admiration of the beauties of nature, is so strong as on first becoming acquainted with the structure and functions of the heart and lungs; upon the conjoined offices of which, all perfect life seems to depend.

Sceptick! amid those wonders, can you find
No art exhibited? no wise end design'd?

What must have been the transports of the illustrious doctor Harvey, when his industry and perseverance brought him to a knowledge of the ebb and flow of the crimson ocean; upon which every thing that is correct or rational in medicine, has been founded.

In this articulation we see beauty, harmony, and design: we see a bone bedded in organized matter, which at once serves as a seat for it to rest upon, a covering to shield it against external injuries, and instruments to move it in every possible direction in subservience to the will; and when she commands the whole to be quiescent, it is fixed or balanced upon its axis.

This bone serves as a point of articulation for the humerus, and as a very superficial cavity receives the large semispherical head of the humerus, or rather as the head is laid on the acetabulum scapula, it is calculated to admit of great freedom of motion; but to this is added the mobility of the scapula, which gives the arm as great a superiority over the inferiour extremities, as its offices and situation demand in regard to motion, but not as to strength; for it is weak and liable to luxation, in proportion to its beauty and freedom of motion. But notwithstanding the immediate articulation is weak, there are certain concomitant circumstances, which render it impossible for luxation to take place in several directions; and the scapula being moveable must serve to prevent luxation frequently; indeed, if it were suffered to move loose always, when the humerus is driven by any force contrary to the will it could not take place at all; but the muscles around it acting on it, fix it, and preserve the natural relations; yet while they thus fix it, the power acting on the arm, drives the head off the glenoid cavity, thus bringing about the disarray in question. When we take a review of our science, we unavoidably observe the intimate connexion succeeding ages have preserved with the circumstances which were characteristic of their predecessors; yet it does not present to us that regularly connected chain, which we see becoming more and more polished in other branches of literature.

It is true the science of surgery generally, has made rapid strides towards a more perfect system; but it is equally true, that in certain points it has remained stationary for half centuries, nay, even whole ones; and has then gone back upon the old ground; which retrograde movement we have been under the necessity of calling an advancement in the science.

In the subject of this essay, we have very little which can be termed a real improvement, since the invention of the *Ambe*, by the father of the science, until very lately; for there is scarcely a method proposed for reduction, that is not a relick of that pernicious machine. We have, it is true, to boast of reducing it when out longer than he did, and lately, that we can overcome the muscular resistance by venesection ad deliquium animi; but when we come to inquire how long the cases which we had boasted of had existed, and find that it does not exceed a few weeks; that numbers have been sent away that had not suffered it to remain more than a few days before they applied, without having it adjusted; we should at least have modesty enough to say we have not yet arrived at perfection.

It appears that this joint has at all periods suffered injury more frequently, than any other; and from modern journals kept at publick institutions, it seems it has been dislocated oftener than all the other joints in the human machine. More attention has at all times been paid to the adjustment of it, than to acquire an accurate knowledge of the anatomy of the parts concerned; but this is particularly applicable to the ancients, who have indulged themselves in the vast field of invention, to make instruments to force the head into the socket; none of which were calculated to effect the object with any degree of certainty; some of which were cruel in their application,

others not founded upon the laws, either of mechanicks, science, or anatomy.

A more matured knowledge of the parts interested, has brought us to the conclusion that it cannot be reduced without extension, and consequently, that there must be counter-extension. To effect these objects, we have a variety of methods: so that upon the whole, there is an exuberant detail of a confused nature, handed down to us upon it, which, although it were a laudable effort to bring order from chaos, it would be too tedious and uninteresting, and would transcend the contracted limits of an inaugural essay, to carry the whole of it through the analytick process: but it becomes strictly necessary to endeavour to find out, and elucidate the cause of failure, amidst all that has been said upon it.

The employment of the useful mariner, is of such a nature, that it subjects him to this accident perhaps more frequently, than any other class of men; and often prevents him from arriving at a port, where he can have it reduced, until (to use the common expression,) "it is too late." Thus, although he prostrates himself at the altar of surgery, he is commanded to depart, and terminate his miserable days, perhaps in beggary! simply because his luxated shoulder cannot be reduced. Oh art! when you are disposed to boast, you "traverse the pathless ocean," be humbled in the dust when you cast your eyes on this unfortunate object! But why is it "too late?" We can relax the muscles by phlebotomy: we can hold the body while a sufficient extension is made, even to pull the arm off the body, as has been unfortunately proven! What obstacle then presents itself? Has the glenoid cavity been filled up with synovia, bone, or any thing else? I apprehend not; nor does the head come up to it, with all the extension if it were; for the muscles have become

shorter, and the head of the bone is tied to the scapula, by the capsular ligament, which has remained, and has become thickened; united to a part of the bone perhaps which it ought not; the head is attached to the contiguous parts; and the whole conjoined bring the scapula along when extension is made, so that it is not at all strange the articular surfaces cannot be placed in coaptation, unless the scapula was held with the body, while the arm is extended.

Although we have many methods proposed to support the scapula, none of them seem to have been planned to operate according to correct anatomical principles, without which, it is as impossible to make any advancement in surgery, as it is for a divine to preach without a knowledge of his bible; so that this deficiency in an apparatus is to be attributed entirely to a want of anatomical investigation. Notwithstanding it requires a little mechanical invention, to apply an instrument according to the laws of anatomy, it is impossible to contemplate correctly the most trifling subject in surgery without calling them forth. Although this is an important truth, the pupil has rarely been quick in the apprehension of it, and when acquired, has ~~not~~ frequently been inactive in the cultivation of the advantages attainable by it. But why is it neglected? Is it not one of the richest feasts, merely to trace the workmanship of his "first cause" in his own economy; yet how much more satisfaction is derivable from becoming acquainted with the laws by which that economy is regulated; the deviations from them which constitutes disease, and the remedy which will restore the healthy functions; thus guarding life as it were, from impending distractions; which it were impossible for him to do, if deficient in a knowledge of natural laws.

Young men appear, not to be so highly impressed with the beauty, and importance of this study, as to make dissections pleasant, and when they come to practice, they are consoled daily by the mistakes of others equally ignorant. A slender and unwarrantable comfort!

It is not from voluntary choice, I have engaged in this essay, but merely in conformity with the laws of the University, whose honours I solicit.

I shall first describe the bones and ligaments concerned in the humeral articulation; secondly, relate some experiments made upon that joint; and, thirdly, go on to speak of the dislocation, and the modes proposed for its relief.

OSTEOLOGY.

THE scapula is a thin bone of a triangular form; the fossa or side next the ribs is concave; the dorsum or exteriour side is convex, is divided into two unequal parts by the spine, which is an acute ridge, crossing the dorsum, leaving the lesser portion superiorly, and vice versa; the shorter side of the triangle is the superiour costa or border; the inferiour costa is seated anteriorly, is all that portion of the border from the neck down to the inferiour angle. The posteriour edge is the longest part of the triangle, and is called the basis of the scapula. The neck is that portion which narrows up and tends towards a point. On this is set the glenoid cavity, or articulating surface. When we look at the face of this surface, it has an oval or rather conical appearance, the base of which, is seated inferiorly and the apex superiorly; the base is more than twice the width of the apex, is turned a little up like a cup as if nature were guarding against luxation where danger presents itself, whilst above, it is narrowed off almost to a point, to make room for the tendons of the muscles to play freely. The greatest diameter, or that from the base to the apex, is about an inch; the crucial diameter is not more than half that extent.

When I lay a line from the apex to the base, and measure under it from the surface of the bone to the line, it is only five lines deep, and when I lay it across between the base

and apex, it does not measure more than two and a half lines, so that if it were not for a cartilage that ekes out the edges in the green subject, it would scarcely deserve the name of a cavity. In laying these lines upon the surface, I have formed a cross or divided the glenoid cavity into four quarters which I shall have frequent occasion to mention in the subsequent part of this essay.

The acromion is that high point which overhangs the head, forming indeed a part of the joint, for although the head does not articulate immediately against it, the space between them is filled up by the more soft parts. This process goes off from the spine, turns round and lays its flat or somewhat concave surface next the head, over it, and defends it against luxation in an upward direction.

The coracoid process is a thick crooked projection about an inch in length: it arises from a little behind the antierior superiour edge of the glenoid cavity, but from its tortuous course it stands with its point rather anteriorly, and must be a great security against luxation. But John Bell says, "most probably when the arm is luxated inwards, it is by starting over the point of this defending process." Now, I cannot conceive, how so correct and so great an anatomist and surgeon could have subscribed to such a sentiment, particularly when he goes on in the next sentence to state that the coraco brachialis muscle arises from the point of this process, which must be broken up from its origin, if the head of the os humeri were to pass directly over the point, and he certainly cannot mean that it mounts over, above the point, breaks off the triangular ligament, and goes over on the lesser pectoral muscle. But when it starts over the point, it must be recollected that the coracoid muscle would not be all that would have to be lacerated for the

second head of the flexor muscle* which arises with it, would also have to be broken up from its origin, which must be impossible, inasmuch as they are when conjoined, so exceedingly strong that no force can operate in the

* This muscle has three heads very frequently: I have seen it in one or both arms of six subjects myself, with a third head arising from the humerus just between the insertion of the coraco brachialis and the origin of the internal brachial muscle; it arises fleshy, bold, and strong, nearly the size of the little finger; it passes down under the interior edge of the common belly of the biceps, over the brachialis internus, decussating its fibres and joins the other heads near the common tendon.

The professor of anatomy did me the honour to demonstrate it to his class in the the first arm in which I saw it, and mentioned that the late doctor Cocke had fallen in with it, but was confused by it, although an excellent anatomist; he suggested the ingenious opinion that some were ambidextra in consequence of this third head. I am induced to believe that it is a very frequent occurrence, and has either been cut up from its origin and left adhering to the under part of the common belly or it has been let fall down upon the brachialis internus by anatomists in general. I have no doubt if doctor Cocke had lived, he would have been able to dissect it out distinctly and demonstrate it to his class.

The following words of the minute anatomist Soemmering will serve to strengthen the opinion that it has often been cut up without being understood. He says, "*nonnumquam os humeri fasciculum exilem ventri longiori addit, vel a musculo brachiali ininterno fasciculus carneus ad musculum bicipitem prope eius tendinem inferiorem communem adcedit; nonnumquam ventris longioris fasciculus ligamento capsulari tendineus inse ritur.*" Now although it is evident he has seen, it is equally evident that he was undetermined about it, in short that he did not understand it. As it was found in the first instance in three subjects of five then in the room, and has been found in most muscular subjects when they were searched, and from these corroborations I cannot think it is a *lusus naturæ*, but think it may be found in the generality of muscular subjects in one or both arms.

manner that would be necessary to break them up. Neither has any surgeon whose writings I have examined, ever witnessed such an occurrence.

The *os humeri* is cylindrical in the middle, but twists and becomes flat inferiorly; this flatness makes the elbow-joint and the outer parts of it form the condyles. It is somewhat rough superiorly, and becomes much larger towards the head, but the head itself, or the articulating surface forms but a small portion of this largeness, for it is a general swelling, and the two tuberosities form a considerable portion of it.

The head is as it were the beginning of a sphere of which it is not quite half, but were it as complete as the head of the thigh bone, it would be much larger; it stands out not at right angles with the shaft, but obliquely.

The neck is a rough, exceedingly small, depression immediately behind the head.

The great trochanter or tuberosity is seated on the superiour and exteriour part of the bone, extending almost as high up as the super surface of the head. The external condyle, this tuberosity, and the apex of the glenoid cavity are in a range nearly when the arm hangs down by the side: but in luxation we find it different, as will be hereafter noticed.

The lesser tuberosity is seated a little lower down, and more anteriorly. When I lay a line along the centre of the shaft, commencing between the two condyles on the anterior side of the arm and ending at the super surface of the bone, which will be about three lines on the articulating surface, it passes directly over this tuberosity: but what I wish particularly noticed is, that it has left the greater portion of the head at one side of the line, which

it is particularly necessary to notice in order to understand the luxation as well as reduction.

The groove for the long head of the biceps is between these two tuberosities at first nearest the lesser, then going obliquely up to get round before the upper portion of the greater tuberosity.

SYNDESMOLOGY.

The head of the bone as well as the glenoid cavity is tipped with a diarthrodial cartilage, which is exceedingly smooth and lubricated with the synovia. They glide on each other with the greatest ease imaginable. The capsula is as smooth as they are, which must make it impossible that sub-luxation should exist a moment.

The clavicle is bound to the scapula by three ligaments, *i. e.* the capsular, or that covering the end of the clavicle and the articular surface of the acromion; the conoid and trapezoid, serving to bind the clavicle to the coracoid process.

The ligaments proper to the scapula are two in number, the anterior and posterior; the former of which only interests us here. It arises thick and strong from the upper edge of the acromion; is inserted into that of the coracoid process, hence we give it the name of coraco-acromion ligament. This ligament must effectually prevent luxation from taking place between these two processes.

The capsular ligament arises from the margin of the glenoid cavity all round, and is inserted around the neck of the humerus. It surrounds the joint, is lax, well lubricated, and well adapted to admit loose and free motion. It is unfortunate that this ligament is weakest at the anterior and inferior quarter of the socket where dislocation

is liable to occur. Above it is strengthened by the tendons of the muscles. Posteriorly it appears rather stronger than it is anteriorly.

I must here beg leave to deviate a little from the usual language of anatomists, while I say something on the long tendon of the flexor cubiti muscle.

The head of the humerus has no ligament such as we find attached to the centre of the head of the thigh bone, to serve as its centre of motion. But the long tendon of the biceps performs an office similar to the *ligamentum rotundum* of the thigh; for the head of the humerus revolves round it, so that it is the centre of motion, although the principal part of the articulating surface or head is at one side of it. Therefore I think it may be properly called the *ligamentum rotundum* of the humerus. Now this circumstance, *i. e.* of the head rolling round this ligament or centre of motion, constitutes one of the differences between this joint and that of the thigh, which seems to have been quite too little attended to. For without understanding it correctly, it appears to me to be impossible to become acquainted with the real state of things relating to the luxation of the joint, and, of necessity, the reduction. But it is very easily understood, for the whole of it amounts to this, that instead of the centre of the head being tied to the centre of the socket, and the head twisting round this centre like a wheel round a pivot the centre of motion is tied to one side; *i. e.* the apex of the socket round which the head has to revolve in all the lateral and rotatory motions of the arm. And in luxation the head must invariably be rolled around this ligament. For as it arises from the apex of the glenoid cavity within the capsule, bends a little over the head, a little around the great tuberosity and gets into the groove which is rather before the arm bone: it is necessary that the arm should be rolled in

order that the head should be turned so as to rupture the capsule and escape within the long head of the triceps, which rolling must be still greater in forward luxation: And reduction cannot take place unless the head is rolled back again through the rupture. I shall have frequent occasion to mention this ligament in the subsequent part of this essay.

EXPERIMENTS.

Having procured suitable subjects at the University, I determined to investigate the phenomena of the luxation and reduction of this joint by experiments, the result of which were as follows:

EXPERIMENT I.

I laid a subject upon a table with his back up, seized the arm, elevated it forcibly with all my strength, but could not luxate it. I then got an assistant to support the scapula whilst I substituted the action of the pectoral and latissimus muscles with one hand on the superiour end of the bone, elevated it forcibly with the other at the elbow, but to my surprise instead of dislocating we fractured the humerus below the tuberosities near the insertion of the pectoralis and latissimus dorsi.

EXPERIMENT II.

I now set about trying to luxate backward on the sound arm: turned over the subject upon his back with his shoulder projecting over the table just so as to let

the neck of the scapula rest upon the edge, thereby supporting the scapula completely: I then got up on the table, took hold of the arm, brought it forward at right angles with the body, stood up with a foot on either side of the subject's breast so as to keep it firm and prevent it from turning, directed the assistant to seize the elbow and press downward with his whole force, while I performed the same operation; but notwithstanding we made several violent efforts sometimes rolling the arm by making a handle of the fore-arm, and sometimes not, no dislocation was produced, when I was compelled to give it up although the subject was so favourably situated for it.

EXPERIMENT III.

Having turned over the subject I determined to renew my efforts to luxate downwards with the addition of making a handle of the fore-arm. After the assistant had laid hold of the scapula as in experiment first, thereby substituting the action of the muscles around it so as to fix it firmly, I laid hold of the elbow with one hand, and of the wrist with the other; then desired the assistant to exert himself in supporting the scapula whilst I forcibly elevated the arm with the hand at the elbow, at the same time rolling the arm with the other at the wrist outwards, and luxation was instantly produced, by rupturing the capsule as I afterwards proved by dissection, just within the long head of the triceps and inferiour angle of the cross laid out upon the glenoid cavity.

I now extended the arm in order to reduce it but there was resistance to extension although there could be no muscular action: nor was the arm reduced until I rolled it while the extension was made; yet when I communicated that motion to it, reduction took place instantly.

EXPERIMENT IV.

Having cleaned away the muscles so as to leave bare the capsular ligament anteriorly. I cut a hole in it commencing at the edge of the glenoid cavity below the coracoid process and anterior angle of the cross and carried it over to its insertion into the neck. I then carried the arm back and forced the head out at this rupture or split, by pushing at the elbow and rolling the arm as above. I here observed that the muscles inserted into the great trochanter were pretty much upon the stretch and slipped the knife under and cut them off so as to let the head out fairly. I now extended the arm without suffering it to roll in order to see if it would be reduced; but it was not, until it was rolled precisely similar to that in a downward direction and in a greater degree.

I next made some more experiments at the inferior rupture of the capsule but they were so similar to the above it is needless to relate them. I also experimented on it in an upward direction but as the result was (as every person of common sense would suppose,) unsuccessful, I shall not detail the methods used.

EXPERIMENT V.

I now cut off all the muscles so as to leave the arm and scapula adhering only by the capsule, passed out the head at the same slit as in the latter experiment, which again rolled the arm, twisted the capsule, and thereby shortened it, and prepared it to resist the necessary extension, for when I extended although every thing was taken away but the capsule, the head would not enter the socket.

Indeed the extension might have been so much increased as after having first drawn the scapula a considerable distance, to have then torn the capsule entirely off before reduction would have taken place if the arm had not been suffered to roll. But as soon as this motion was communicated to it, it reentered the socket with a very slight extension.

EXPERIMENT VI.

I wished to see how far the head could be carried without this ligament being torn entirely off. After cutting it considerably but having left the upper part adhering, I turned it round, pushed it over upon the breast and then upwards nearly against the clavicle, without effecting that consequence.

From these experiments the following conclusions may be drawn.

1st. That luxation cannot take place directly downwards in consequence of the long head of the triceps pressing up against the capsule even when the scapula is fixed, an artificial force substituted for the action of the pectoral, latissimus and terus major muscles, and a sufficient force exerted to fracture the bone.

2d. That it cannot take place backwards under any circumstances whatever. Not in consequence of the capsule being much stronger posteriorly than it is anteriorly, but because of circumstances relating more to the peculiar mechanism of it: for although in the experiment from which the conclusion is drawn, it was much more favourably situated than can ever take place in the living subject unless it were gone about as deliberately as it was

here, a fracture of the neck* of the scapula would be more likely to take place than a rupture of the capsule. It is evident that when the arm is brought forward across the breast, the head is so rolled in the socket as to turn up the round ligament in such a manner that it would of necessity have to be broken off when the arm is forced back sufficiently to rupture the capsule and pass out the head; so that it would be necessary to have the arm rolled downwards and backwards while the force operates at the elbow, in order to disentangle this tendon, as well as to turn down and relax the subscapularis, which would have to be broken up from its insertion. But it is certainly very evident that this kind of rolling cannot be communicated to the arm in falls, or in any of the common accidents; but if it were, the body would roll over so as to turn the other side downwards, unless it was wedged up by some means that would prevent it. Even then, the joint would be stronger than the attachments of the scapula to the clavicle which might give way, and leave nothing to prevent the scapula from being pushed off, but the pectoralis minor,† which would be a very slender support. Therefore it becomes necessary that the patient's back should be placed so neatly against something, as to support the scapula and let the neck project over

* As J. Bell says, in speaking of the neck, "which no doubt sometimes, gives way and breaks," I think it would here be very favourably situated for fracture to take place.

† In a dissection which I made, this muscle was torn across without any rupture in the integuments which was witnessed by some of my fellow graduates. I was however unable to learn how it had taken place or of what the subject died, and not having my attention directed to the dislocation of the joint at that time I neglected to examine minutely the state of it.

the edge, which is as hard to conceive how it could accidentally be so fixed, as some of the above necessary circumstances.

Notwithstanding surgeons in general admit the possibility of the bone being luxated backwards, and some of them describe the pain accompanying it, together with a long catalogue of symptoms: yet as no case of it has ever existed any other where than in the imagination; and as the mechanism of the parts is such as to render it impossible that it should ever exist any where else; I reject it unhesitatingly.

3d. The conclusion may be drawn that when the scapula is supported or fixed, a force substituted for the pectoral and latissimus, and the arm rolled by making a handle of the fore-arm, luxation will take place with a far less force than is required to fracture the bone: not exactly downwards in the centre of the glenoid cavity, but within the long head of the triceps and inferiour angle of the cross; therefore it is properly called luxation downwards and inwards.

The mechanism of this luxation in the living subject must be as follows. When a person falls, he either catches at any object he may pass by, or plants his hand on the ground if he reaches it; in either case, the fore-arm becomes a handle, and rolls the head around the ligamentum rotundum which is its centre of motion: at the same time the arm is converted into a lever of the first kind, the fulcrum of which is the pectoralis major, latissimus, and teres major, the power is at the elbow, or rather the fore-arm, and the weight raised at the head. Agreeable to the laws of mechanicks the lever must either break, the prop move, or the weight be raised, if the force is strong enough; but it cannot break and raise the weight too, notwithstanding what has been said about the hume-

rus being fractured and dislocated at the same time. Here the weight is raised; for the head ruptures the capsule and rolls out.

It becomes necessary here to explain the manner in which the muscles become agents in the production of the disarray, which they unquestionably do, as is proven by the insurmountable difficulty experienced in attempting dislocation in the dead subject until a force is substituted for their action, and the well known fact that a drunk animal in the shape of a man will fall perhaps an hundred times without injury to the joint, when the fall is such as would in ninety nine cases of the hundred, dislocate the arm of a rational being, or communicate some other injury perhaps more serious.

When a man in his senses falls, he brings into action the whole of the muscles surrounding the scapula, all that have any operation on the arm and fore-arm calculated to bring the arm into a situation that will support the body: those acting on the scapula fix it obstinately, those of the fore-arm plant the hand to save the elbow; the pectoralis major, latissimus, and teres major, operate to bring the arm in nearer the centre of gravity, but being overpowered and foiled in their design they only balance or fix it where they seize on it, thereby preventing it from rising: or, becoming the fulcrum, prop, or centre of motion, and as the scapula is fixed the head passes down off the articulating surface, which could not take place if the articular cavity were not prevented from moving with it by the muscles around the scapula

Luxation from blows has been denied by some, yet others entitled to equal credit have seen it, in fact I have seen a case* myself which sets the existance of it beyond

* This case was treated in a very clumsy manner for a fracture of the bone, and suffered to remain out six weeks; a mistake which could only originate from unpardonable ignorance.

dispute with me: nor do I conceive it difficult to account for. When a person sees a blow approaching, the will sends its mandates to the muscles, they obey, contract around the scapula, and fix it: the arm is thrown up as it were to ward off the stroke; this motion rolls the arm, and the blow still finding its way to the superiour end of the bone rolls the head through the capsule.

Again it appears (by this experiment,) that the arm must be rolled back again in the reduction, a circumstance too little attended to by surgeons in general.

4th. I infer that when luxation takes place forwards the arm is rolled in the same manner as in that downwards, but in a greater degree: that the mechanism of it only differs in the arm being carried farther back and rolled more: and that the reduction is the same with the exception of the direction of the extension, and the degree of rolling it back again.

5th. From the result of this experiment it may be concluded that the capsule will make resistance to extension sufficient to draw the scapula along even in recent cases, because of the rolling motion of the arm when passing out, twisting it, and necessarily shortening it, and this ligament must become a more prominent resistance in old cases, for when inflamed, thickened, and united to parts of the bone to which it does not properly belong, and the action of the muscles sending the head of the bone farther back, will alter its form entirely: therefore in reduction of cases of this description it will have to be broken up from its preturnatural adhesions as well as the shortened muscles extended, and the cellular adhesions to the head torn up, which it appears almost impossible to accomplish without having the scapula well supported while extension is making.

6th. I conclude that the head may be carried a considerable distance from the socket without tearing this ligament entirely off; and consequently that it may remain slightly attached even in some consecutive cases forwards, and upwards, and will present itself as an obstacle to reduction in cases of this description.

Upon the whole I conclude that there is only one fourth of the socket at which the disarray can take place, *i. e.* between the antierior and inferior angles of the cross or below the coracoid process, and before the long head of the triceps, in other words forwards and downwards, and downwards and inwards. In short, primitive luxation may take place at any part of the cavity between these two angles of the cross and at no other.*

* In occupying this ground, I am fully aware I differ from almost all respectable authors; yet I conceive that my title to an opinion is as great as any of theirs, though at the same time the opinion should be incorrect.

The Greek physicians divided the luxations into four directions, as downward, upward, forward, and backward: sometimes their expressions differ, and perhaps their meaning.

Hippocrates demonstrates the fallacy of their divisions and has the following words, "At vero humerus, inferiorem in partum excidit aliam in partem excidere non audivi." Galen admits of four kinds. Oribazes and Paul of Ægina admit of three. Celsus who was certainly nearly correct says, "Humerus, modo in aliam excidit, modo in partem priorem."

Heister and Petit making great pretensions to anatomy, by which they attempted to tear down the whole fabrick before built, admit of four kinds. They attempt to point out anatomically the part at which it escapes; as for instance, the latter speaks of dislocation forwards between the coracoid process and the clavicle. I should like to know what this is but upwards, as well as what "thunderbolt" sent it there; for I cannot manage to get the head even of the dry bone between the two processes, without breaking off one or other of them. But what becomes of the coraco, acromion

Consecutive luxation may succeed any primitive case when a secondary accident occurs. The head may pass either forwards or upwards, but it can never go backwards, being prevented by the long head of the triceps muscle; nor can it go downwards.

SYMPTOMS.

THE signs of all primitive luxations are pretty much the same, the principal difference is that when it is forwards the arm is carried farther back, and the exterior condyle is turned farther backward, indeed instead of its being in a range with the most salient part of the shoulder, the internal one comes almost as near corresponding with it.

ligament? Again, he speaks of backwards below the spine of the scapula; a case hard to conceive and I rather think harder to see.

Duverney appears to be the first who divided this luxation into primitive and consecutive, he admits of downward only, to be primitive. Desault, Boyer, Pare, Freke, Fabre, D'Apouy, Cooper, &c. admit of three kinds, *i. e.* downward, inward, and outward, and however fallacious this division may be, it is generally received by our surgeons; for although they differ a little in expression, and perhaps in meaning, their divisions amount at last to this or nearly so. But the fact is, we have so confused a mass of jargon that it is hard to understand what they mean by their expressions of downward, inward, forward, outward, backward, &c. indeed these words have been used by several who were divided in their meaning although the expressions were the same: others have used a different language to convey the same meaning.

Benjamin Bell admits of four kinds none of which are correct.

Charles Bell adopts almost the same division of Celsus which is unquestionably very near correct.

As the division I have adopted is founded upon experiment, and as this shapeless mass would serve no other purpose than to confuse, I have been induced to place it in a foot note.

As Hippocrates has observed, there is always a depression underneath the acromion, which process appears more prominent than when the head has its proper relation to it. The integuments on the exterior side of the arm are more lax, and consequently feel softer: the arm cannot be brought forwards without excruciating torture. The fore-arm is in a state of semi-flexion, and cannot be extended without giving pain. The patient cannot bring his hand to his head by performing a semicircle with it, but stoops his head to meet the hand on attempting it. When the arm is moved in any way, the scapula moves with it, as if the joint were ankylosed.

The head of the bone is always to be felt in the axilla, but if the dislocation should be forwards, it will make a prominence more under the great pectoral muscle.

If the case should be downwards, the arm will be somewhat longer than the other, but although we are advised to strip the patient in all cases, and examine the relative heights of the elbows,* this is not an unequivocal symptom, for in fractured clavicle the shoulder hangs down and the patient leans to the affected side, which causes that elbow to hang lower than the other. Nor do we find the elbow set upon the hip as we are told by respectable authority;† it is very hard to conceive how it would get to the hip.‡ Inflammation and swelling come on in the general shortly after dislocation takes place, but they have a tendency rather to prevent the disarray from being understood, than to give us any admonition of its existence or nature.

* Vide Boyer on the bones as edited by Richrand, page 242.

† Vide Desault as edited by Bichat, page 115, and others.

‡ They probably mean the ala of the os innominatum instead of the os sedentaria.

The symptoms of consecutive luxation are not materially different from those of the primitive; if it should be forwards the elbow will stand back, the head will make a prominence upon the breast; should it go upward the arm will be somewhat shortened to appearance, &c.

Œdema and paralysis sometimes take place, both of them are occasioned by the pressure of the head; the former on the lymphatics, and the latter on the nerves; when either exists reduction should immediately be resorted to if possible.

REDUCTION.

As the various methods which have been proposed and practised for the reduction are so very numerous, I shall not pretend to enumerate or investigate their inutility. Nor is it necessary that I should pay strict attention to any of them, but particularly to machines which operated by forcing the head into the socket, either with or without extension, as, for example, the ambi with its various alterations and presumed improvements, the method of hanging the patient over a high step of a ladder, the head of a door, a pole, &c. that of the heel in the axilla, and a number of other methods better calculated to fracture the humerus, ribs, &c. produce paralysis, œdema, cancer, aneurism, ecchymosis, &c. &c. which are all very justly exploded.

These methods have all undergone sufficient investigation by several surgical authors* who have come to the conclusion that no method but that by extension is proper. But although they speak of reduction by means of extension alone on the part of the surgeon, and trust

* Desault and his followers.

to the muscles to replace the bone,* it has certainly always been necessary to make counter-extension, for although it is a kind of *vis inertiae*, if the patient is tied down or held by any means whatever, the force which holds him there is as great as the extending force, otherwise the body would be drawn along.

Several methods have been employed to make the extension. Sometimes different forms of machinery have been used, sometimes assistants have been employed, at other times the surgeon has affected to make it himself.†

The pulley is the form of machinery in most common use, the number of which has been greatly multiplied, sometimes indeed they have been increased so much, and so violent a force exerted as to produce laceration,‡ and nearly take the arm off. They have sometimes been made to act horizontally, while the counter extension is accomplished by tying the patient to a post, bench, table, or something similar, or he is held by assistants. At other times they act vertically,§ in which case the weight of the patient makes the counter extension.

Counter-extension is now most generally made by passing a folded sheet or something similar under the axilla, which is carried round across the breast and back, either with or without some substance in the axilla, but most generally there is a pad, ball, or wedge of some kind placed in it. This is the method of Desault, whom, it is

* Vide Desault as edited by Bichat, pages 125 and 133.

† Vide Desault, page 125.

‡ Vide Richrand's Boyer on the bones, vol. 1, page 246. In this same page is recorded a melancholy case of torture by another form of machinery.

§ See Heys cases, which will serve to shew the inutility of this method.

to be lamented, most of our surgeons follow. In speaking of his assistants he says* “they should furnish themselves with a linen ball, thick enough to project beyond the level of the pectoralis major, and the latissimus dorsi when placed in the axilla.” This ball will unquestionably have the most pernicious effects in the axilla, if it is hard enough to keep the folded cloth off these muscles. 1st. It may produce all the evils enumerated above, when speaking of other methods of applying substances in the axilla, except fracture. 2d. It will press up the head of the bone into the neck of the scapula and there lock it effectually. 3d. It will effectually prevent the head from returning into the axilla, should the case be either a forward or upward one,† as it must occupy the whole of the axilla. 4th. The pressure made by it on the inside of the muscles forming the axilla will stimulate them to spasmodick contraction: which evil will be increased by the sheet passing around them exteriorly. 5th. It effectually prevents the surgeon from knowing what is going on in the axilla, or giving any assistance which is not infrequently necessary, for although the muscles are trusted to to replace the bone, they will unquestionably often disappoint those who rely upon them altogether: we have at once two of the muscles operating directly opposite to our wishes, *i. e.* the subscapularis and teres minor; and this ball will press upon them so as to prevent them from being extended, indeed even shorten them so as to hold the head down more firmly.

Boyer and others have no doubt seen the evils of the ball; (which must be almost as bad as wood when pressed upon,) and have recommended softer materials. This is not only liable to most of the above objections,

* As edited by Bichat.

† Consecutive cases are here alluded to.

but is not calculated to effect the object for which it is intended, inasmuch as it will let down the sheet upon the muscles forming the axilla, which will shorten them by bringing their points of origin and insertion nearer each other (even if means are taken to destroy the irritability of them, so as to prevent them from being stimulated into spasmodick contraction,) and thereby draw the head farther back, instead of reducing or suffering it to move forward.

Desault* recommends another band to be placed on the acromion, and carried across anteriorly and posteriorly, and obliquely downwards for the purpose of supporting the scapula. When this is so applied as to take hold of the acromion it will press the deltoid and other soft parts into the socket so as to fill it up, which will prevent the head from reentering. This strap or any means used to depress the acromion in this manner will have a tendency to press the neck down upon the head which will assist the wedge below in locking the head in the neck; and this is certainly not a situation favourable for its reduction. Some other methods have been used for the purpose of supporting the scapula, as the sling, or split strap of Petit: the ring, or towel rolled up in the manner of a ring,† as related by doctor Potter in a case published in the *Lycæum*: but they are liable to gather up so as to press upon the pectoralis major, latissimus dorsi, and teres major, and will shorten or bring their points of origin and insertion nearer each other, independent of their being irritated to spasmodick contractions.

* Boyer, Bell, and several other surgeons, recommend this method of supporting the scapula either by a bandage of some kind, by assistants, or both conjoined.

† I am informed this was suggested by the late doctor Cocke; but the towel, or something similar, has been often used in other forms.

As none of these means of making counter-extension, or supporting the scapula, appear to me calculated to accomplish those objects in a correct manner, the latter of which, is unquestionably a very important desideratum, I shall beg leave to suggest the propriety of applying an apparatus which I have constructed to fasten the counter-extending instruments to, and at the same time support the scapula, a delineation of which I have given in the plate.

The base of this instrument is intended to be placed against the side, when the arm is passed through the hole in the centre, so as to let the neck or upper part over the round of the shoulder behind the origin of the deltoid muscle; and as it is hollowed out to fit the side and well cushioned, I conceive it to be well calculated to make a great share of the counter-extension upon, by fastening sheets or something of the kind in the rings of that end, which may be passed across to the opposite side anteriorly and posteriorly. The straps are somewhat raised off the walls of the body by passing over the edge of the apparatus and the anterior one will pass below the mammæ. When the screw is moved up above the latissimus dorsi and teres major, on their way from the angle of the scapula to the arm, there is a large open space left for them to pass through safe from pressure. The screw may be turned in order to pass the point (which is well cushioned/in)) so as to take hold upon the inferior costa of the scapula. There is nothing here that is in danger of injury except a branch of the subscapularis artery, which winds over the edge of the bone, but somewhat lower down than the screw, when raised to a proper height. The teres minor is more deeply seated than it will press, and goes up the edge of the scapula so nearly that it can only be slightly pressed upon, if at all.

The shoulder above this will press upon the superiour costa of the scapula and super edge of the spine. Here the scapula represents to us something similar to a wedge, the larger portion of which is its base. As this wedge is seized or held between points composed of materials which are unyielding, of course agreeable to the laws of mechanicks, it cannot enter any farther.

The spine of the scapula and the clavicle form another wedge, which is held in the neck or superiour part of the apparatus which is also unyielding and consequently this wedge cannot enter.

The large arch anteriorly is calculated to transmit the pectoralis major entirely clear of pressure: below this there is sufficient room left for the surgeon to feel in the axilla with his hand and render any assistance necessary. Or for persons who will not be persuaded to give up the pernicious practice of placing substances in the axilla to apply them.

The rings above are intended to fasten another set of straps in, thereby dividing the force, but the most of it will be against the side.

All these straps, sheets, or whatever is used may be fastened together and held by one or more assistants. They might be tied to a post if assistants could not be had, but this is not so convenient particularly when bleeding is practised to produce syncope.

When a luxation shall have remained long without reduction there are several circumstances supposed to render it often impracticable and always difficult: such as the idea that the synovia becomes inspissated, the socket is filled up with bone, the new adhesions formed, the rupture in the capsule being too small,* the contraction or

* This has been thought to present itself as an obstacle to the reduction of recent cases by Desault and his followers; but it is

shortening of the muscles, the capsule being in part still attached to the scapula and head of the humerus, and the mobility of the scapula.

I cannot subscribe to an opinion that the socket is filled up either by synovia or bone, but should the luxation be suffered to exist long enough, it will be in part at least absorbed and carried away, as the acetabulum in the hip joint is, as the alveolar processes in the jaws are when the teeth are extracted, and all other animal matter which becomes useless.

The new adhesions together with the part of the capsule which remains untorn are the most formidable obstacles and render it indispensibly necessary to have the scapula supported in order that they may be broken up, so as to suffer the head to advance to the socket.

The muscles can be relaxed by phlebotomy sufficiently to overcome their contractile resistance: but from their being out of use for a long time, the redundant part of them while in this situation is absorbed as well as the bone which is useless; examples of which we see every day in the streets, vulgarly called contracted ham-strings. Notwithstanding this is the state of the muscles I am convinced by experiments made upon the muscles of the dead subject, they can be stretched beyond their natural length sufficiently to suffer the head to come up to the socket when they are relaxed by bleeding *ad deliquium animi*; which I conceive to be a state in which the pow-

hard for me to conceive how the head would get out if it was too small to allow it to return, nor can I conceive that the edges of it can get into the neck of the humerus as it is so superficial in the dry bones, and is entirely filled up by the remaining sound part of the capsule itself in the green subject: neither is the capsule capable of contracting. All that is wanting is to roll the head in, and by that means the twist is taken from the capsule. *Vide experiments.*

ers of the muscular fibre are very analagous to that of the muscle of the dead subject.

I now come to the conclusion that the following indications must of necessity be fulfilled in order to accomplish the reduction with the most certainty, the least pain to the patient, the least waste of time, and the greatest ease to the surgeon. *Viz:*

1st. To overcome the resistance of the muscles by relaxing them.

2d. To make an adequate extension.

3d. To make sufficient counter-extension; part of which must be on the scapula in order to keep the body and it together.

4th. To roll the arm inwards, and make it retrace the rout it took in passing out.

The first of these indications will be better fulfilled by bloodletting *ad diliquium animi* than any other. Some other means have been employed to accomplish this object, but they are not only inadequate, but are liable to other serious objections; as (for instance,) the use of opium and spirituous liquors which should not be encouraged if they were effectual, as it is giving encouragement to bad morals.

The warm bath would perhaps answer were it persisted in sufficiently: but it is inapplicable to one sex, is always attended with some difficulty, and under certain circumstances (as on board ships,) cannot be had recourse to. Nor is it a favourable situation for operating, to have the patient in a bath, and if he is taken out he is exposed to cold, and the syncope goes off before reduction can be completed.

There is little doubt but in the general our patient will think it cruel to tie up his arm and bleed him for the express purpose of making him faint: but when he comes to un-

derstand that it is attended with no hazard, that instead of giving pain it secures him against it in the most effectual manner, and that it cannot be dispensed with; he cannot hesitate a moment to submit to it.

The second indication will be much better accomplished by assistants than machinery of any kind whatever. 1st. Because the force can be better regulated according to the circumstances of the case; for it can certainly be increased sufficiently. 2d. The direction of the extension can be varied with greater facility. 3d. The danger of too great an accumulation of force is not so great.

A dispute has arisen about the place most proper for applying the apparatus by which the extension is made. Pott and his followers apply it to the arm, 1st. because they conceive a part of the force is lost in the elbow-joint; 2d. they argue that the stretching of its ligaments injures the joint; 3d. they flex the fore-arm in order to relax the muscles.

Desault, and most of our surgeons; (who have followed him,) deny the loss of any of the power in the joint; contend that if the flexor muscle is relaxed, the extensor is put upon the stretch, which they say is as much entitled to attention. They also contend that the bandages on the arm stimulate its muscles to spasmodick contractions and therefore apply them to the fore-arm.

That the force operates on the shoulder joint alike in both cases, I am not disposed to doubt: yet the elbow joint most unquestionably undergoes unnecessary torture, and perhaps serious injury. But I cannot agree that the extensor is entitled to as much attention as the flexor.

1st. Because there are two heads of the latter from the scapula and but one of the former.

2d. The long head of the flexor is entitled to particular and separate attention as it is so much more inter-

ested in the joint. The very circumstance of the fore-arm being in a state of semi-flexion shows that it ought not to be extended; for as the long head in the groove is turned down with the head while it still adheres at its origin the muscle is shortened, and if we extend the fore-arm, it must be put upon the stretch and perhaps the long tendon broke; even before the arm can be straightened.

3d. It is strictly necessary that the round ligament the centre of motion, or long tendon of the flexor, should remain relaxed in order to suffer the head to roll around it in passing into the socket; whereas if it is made tense the head will be bound between it and the long head of the extensor so as to prevent it from entering the socket.

If the napkins or whatever is used are applied to the arm when *deliquium animi* is not produced it is very probable the muscles will be stimulated to contractions; but whether or no such an application would then be sufficient to rouse them into spasms, becomes a query. It appears to me if a silk handkerchief, a folded piece of flannel, or some soft material were neatly applied around, immediately above the condyles, that the muscles here have become so far tendinous that no application of that kind could rouse them into spasms when our patient is in that state

I should therefore with Pott, &c. apply the apparatus there, which will leave the fore-arm in a favourable situation to fulfil the last indication by making a handle* of it to roll the head around the *ligamentum rotundum*.

The apparatus for making the counter-extension, and supporting the scapula being properly fixed upon the shoulder, and the straps or sheets held by an adequate

* Since this essay was written I have been politely favoured with an opportunity of reading Mr. Charles Bell's operative surgery, and find that he recommends this method.

number of assistants. The handkerchief or something similar is to be fixed upon the arm and held by a sufficient number of assistants. The patient is to be placed upon his feet* with a stool behind him. The surgeon is to tie up the sound arm and open a vein largely, in order to permit the blood to flow freely until he fall into syncope: he is then to be seated and the blood stopped. The surgeon is then to place one hand in the axilla and the other upon the wrist of the affected arm: he is then to order the distracting forces to be set in operation; have them increased to a sufficient degree, and the arm extended in the proper direction, which will perhaps generally be more or less backward as the case may be, or forward or downward, and somewhat elevated. It will however have to be varied and rolled a little cautiously, but not thrown upwards, downwards, and rolled in every direction, in a most cruel and barbarous manner as we are advised, which cannot fail to tear off the capsule entirely, to produce paralysis,† &c.

The surgeon is now to roll the arm inwards with the hand at the wrist, at the same time advising the assistants to carry it somewhat forwards. While with the hand at the superiour end of the humerus he elevates the head to the socket: or in other words extends the subscapularis and teres minor muscles.

* This position of the patient calls upon the brain for a greater supply of nervous energy than when a number of the muscles are idle, as in a horizontal or setting posture, which deprives the heart of it; while its stimulus flows (the blood,) in a sudden gush, and by this means the patient faints with a less waste of blood, than if he were bled in the ordinary posture.

† For an account of a case of paralysis produced in this manner, see Desault as edited by Bichat, page 119.

And now the reduction will be accomplished perhaps in a minute or two after syncope is induced, and the patient will rise as if awaking out of sweet and sound sleep, without ever having had occasion to groan, while one of the severest operations in surgery has been accomplished; an operation which has taken a whole day in the hands of the most eminent surgeons, as will appear from the following extract from Bichat's Desault. When speaking of some methods of overcoming the muscular resistance he says "what is much better, a powerful extension continued for some time; in consequence of such extension, the muscles of the part become fatigued, whence their contractions are succeeded by a state of atony, of which advantage may be taken to replace the bone. Frequently this extension ought to be continued for a very long time, and we have known Desault not to complete the reduction in less than half a day, or even a whole day." When this was much the best plan, which kept the patient in torture all that time, there was really room left for improvement, which I am happy to say, the world is indebted to our countryman doctor Physick for; for although venesection had been used by many, it seems never to have been carried to the proper extent until he advocated and practised it.

But this practice of Desault certainly is better than many others, who would take a day or two in trying different methods,* and perhaps then only succeed by chance; when the arm was suffered to fall and roll in of itself,† or some other fortunate accident ensue.

It is impossible to enumerate all the address that is necessary in the reduction; several things may be suggested during the operation that are not here described. Ex-

* Vide Hey's cases.

† See case V. page 188 of Hey.

perience and address are both requisite to accomplish it before the patient rouses from the state of syncope.

In the case before mentioned,* which was out six weeks, I had the pleasure of assisting in the reduction, which was accomplished in three or four minutes, even without any support to the scapula. And in other cases in which it had remained out a shorter time, it has been accomplished before the patient recovered from the state of syncope; but in these cases I have witnessed the necessity for a support to the scapula, which would affect that important purpose better than any thing yet in the possession of the surgeon: and have constructed the supporter, which I have here taken the liberty to present to the publick. If it should in future be proven to be defective in principle, I hope I cannot be censured for attempting to fill up what appears to me to be a serious deficiency.

The reduction may very frequently be accomplished without this apparatus or bleeding either in recent cases. The method here proposed has been chiefly directed to cases of long standing: for I should never think of being guilty of the deed of turning a patient away because "it is too late," even if it were out ten or twenty years. Notwithstanding an artificial socket may be formed; the motions of the arm are so contracted when the head is out of its place, that it is almost useless. But although the socket may be partly obliterated, if we replace the head into its natural situation, a new socket may be formed there again, either of bone* or the more soft parts, which will admit of free motion.

* Vide page 27.

* See the second case related by doctor Henry Thomson in the London medical and surgical observations; where, upon dissection, (which is the best of all proofs in surgery,) a socket of osseous matter was found around the head.

But if a new socket of bone should not be formed, there will at least be some bone there, and the coracoid and acromion process will assist in guarding the head, as will the muscles, while the cellular and ligamentous substances condense into a kind of artificial socket, if proper precautions are taken to retain the head in its place, and gentle motions are communicated to the arm frequently.

I have to regret exceedingly that a torturing disease has deprived me of a great share of the short space of time allowed the pupil to prepare his thesis, after the first examination: which has compelled me to submit for examination, and publish to the world, what I had sketched off in great haste, without taking that general view of the opinions of the different authors who have written upon the subject, which I was preparing to do when taken sick.

And I hope this will in some measure apologize for some opinions being made use of without noticing their authors; indeed there are some ideas advanced, which having become so much the common property of all surgeons who may adopt them, it is difficult to trace to any authority.

Before I withdraw I must acknowledge my gratitude to the professors under whose auspices I have prosecuted my search for medical knowledge, for the advantages I have received from their lectures. No exertion on their part has been wanting, no aid withheld, that could contribute to improvement. From the *institution* I have nothing more to look for as an individual, but I will always sincerely wish for its prosperity, and the individual happiness of the men whose talents, industry, and indefatigable diligence has reared it from nothing, and supported it with honour.

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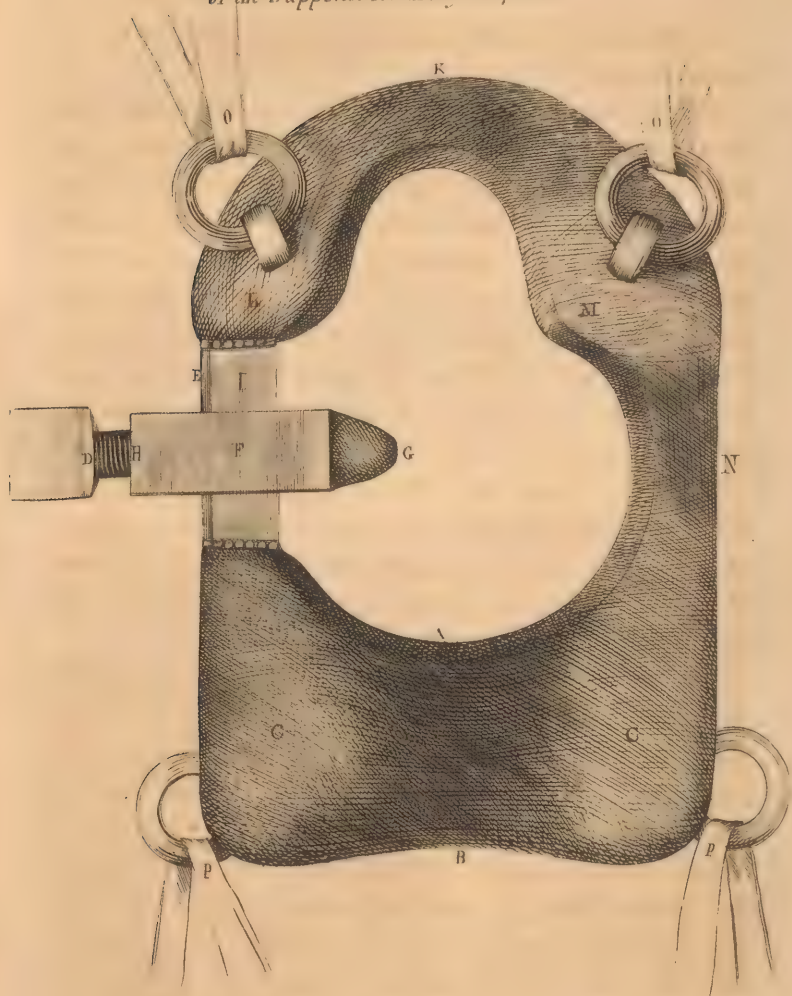
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*A FRONT VIEW
of the Supporter for the left Scapula .*



EXPLANATION OF THE PLATE.

A The centre of the superiour portion of the base of the apparatus.

B The inferiour portion. The base is covered with cloth or morocco, under which sufficient cushioning of some elastick material is placed. The wood is curved considerably at this part of the instrument, but in addition to this curve the cushioning is much thicker at C C in order to make it fit the sides. This is the portion upon which is made the greater part of the counter-extension.

D The screw which has its button-like point received into a collar in the centre of the brass plate, upon the side of the apparatus, the edge of which is seen at E.

F A brass frame, the sides of which pass on the front and back of the apparatus, on which is placed the cushioned point at G, which is intended to press in and take hold of the inferiour costa of the scapula, and keep its angle stationary.

The *top* of the screw is at H, brazed in between the plates F, and making one short square of the frame which moves out and in upon the screw when turned. The frame and screw are moved together, the latter with its point in the collar, and the former around the part I which renders it capable of being raised or lowered, to suit the different sizes. It should be let down to its lowest, when the apparatus is passed over the shoulder of the larger size, in order to leave sufficient room above it, and then may be raised to leave an open space below it, for the safe transmission of the latissimus Dorsi and teres major muscles.

K The apex of the instrument, which stands over farther than the centre of the base. This bend lets the neck over the shoulder while the bass is fitted to the side.

L The shoulder which presses against the spine and superiour costa of the seapula: it is well cushioned and is above the plane of the apex, owing to the curvature of the instrument.

M The shoulder which presses against the anterior edge of the clavicle between the origins of the pectoralis major and deltoids, therefore (as is necessary) it is so constructed as to lean over in order to get against that part, and is seen in a plane considerably above the remainder of the apparatus in consequence of this curve.

N Is the large arch for the safe transmission of the pectoralis major.

O O The two superiour rings with straps fastened into them which are to pass to the opposite side of the patient anteriorly and posteriorly, by which part of the counter-extension is made.

P P The two inferiour rings, fixed into the dorsum of the apparatus, which have also two straps fastened into them to make counter-extension. The straps pass around the edges, and are thereby raised up, so as to prevent pressure on the parietes of the thorax.

This apparatus may be varied in construction in several parts and act upon the same principle; I have made three, all of which differ in some particulars, but it is needless to explain their difference as they do not vary in principle. The supporter for the right side being nothing more than this reversed, to give a plate and explanation of it would be unnecessary.

APPENDIX.

SINCE the preceding essay was written, a case of luxated shoulder joint has fallen under the care of my preceptor, in the reduction of which I had an opportunity of witnessing the advantages of the supporter suggested in the essay, a delineation of which is annexed thereto. The circumstances attending the case were as follow.

April 16th, 1815, John Jenney, (who is a stout muscular man twenty one years old,) having engaged in a personal contest was thrown by his antagonist with violence upon the pavement, which fall dislocated the os humeri. He came to my preceptor's office early next morning in order to obtain relief. On examination but little tumefaction had taken place; and the head was found rather under the pectoralis major making a prominence of that muscle; yet it was not fairly a forward luxation. The head must have ruptured the capsular ligament about mid-way between the anteriour and inferiour angles of the cross* in assuming that position. The arm was fixed backward with the exterior condyle turned downwards posteriorly, the fore-arm in a state of semi-flexion and all the ordinary symptoms were present. Wishing to be more decided with respect to the impropriety of the general practice of applying the extending apparatus to the wrist and the importance assigned to their application upon the arm in the essay, I directed him to extend the fore-arm; but none of his efforts were at all sufficient to straighten it or change its flexion: I then applied considerable force to the wrist without being able to extend it, which occasioned great pain and caused him to cry out more than he after-

* Vide page 16.

wards had occasion to do during the reduction. In short, I do not doubt in the least that if a sufficient force had been exerted, the long tendon of the flexor muscle would have been very much stretched and perhaps broken, which latter occurrence would no doubt favour a replacement of the bone, but this would not be accomplishing the kind of reduction which should be the object of the surgeon. In no other way I conceive can reapposition be effected than by the laceration of this ligament when the force applied operates to keep it tense.

The apparatus for counter-extension and scapular support having been lodged with the Professor of Surgery; the reduction was deferred until one o'clock in the afternoon when it was obtained and applied in the proper manner, *i. e.* the screw was let down to the inferior part of the portion upon which it slides, and turned so as to draw back the cushioned point of the frame, thereby leaving room above it to let the arm through and pass the apparatus over the round of the shoulder, so as to let the proper portion press upon the clavicle at that part of it which is between the origins of the pectoralis major and deltoides; then the apparatus was drawn down so as to receive that bone and the spine of the clavicle into its neck. The screw was now raised above the latissimus dorsi and teres major on their course from the angle of the scapula to the humerus; and was turned in order to press in the cushioned point so as to take hold upon the inferior costa of the scapula. Napkins were now fastened into the rings, carried round on either side, and given to two assistants to make the counter-extension.

A handkerchief was tied in the form of a ring around the arm above the condyles but close upon them, and the fore-arm fixed in a flexed position nearly at right angles with the arm: other handkerchiefs were fastened into this on either side. These handkerchiefs were given to assistants by which they made the extension.

The patient's sound arm was now tied up and a vein opened with a spring lancet of the ordinary size. He was then directed to stand in an erect posture; the blood flowed in a usual stream. As the patient was very strong I became apprehensive he would not faint soon, and as there was another very good vein in the arm, I suggested the propriety of opening it also, lest there should be an unnecessary waste of blood by the abstraction being too slow to produce syncope early.* This was however deferred until about twenty ounces were drawn, when he became faint, and asked leave to sit down upon a stool which was provided for him. The blood now ceased to flow as it will always spontaneously do when syncope is approaching; which renders it unnecessary that the surgeon should occupy time in tying up the arm after the ordinary manner of stopping blood. The bandage was untied which was deemed sufficient security against the farther flow of blood.

The distracting forces were now ordered into operation, whilst the arm was elevated at its superiour extremity, and rolled inwards by making a handle of the fore-arm, which brought the head nearly on the edge of the socket. But the patient not having been in a complete state of deliquium animi now began to recover, and the blood again flowed. The bandage being now replaced by one of the young medical gentlemen present, encouraged the flowing of blood, which very soon produced syncope, and the head passed completely into the socket without any more extension than the gentle degree that was kept up in order to retain what had been previously gained, and with a slight, elevation of the superiour end of the humerus, or extension of the subscapularis and teres minor muscles. The noise occasioned by the two articulating surfaces coming

* See essay page 42, for an explanation of this idea.

into contact (which has often been noticed upon similar occasions,) was very distinctly heard in this case when reapposition took place, which was in less than five minutes from the time the forces were brought into operation.

I cannot avoid saying here that the supporter effected the object for which it was applied better than I had calculated upon. Nor did it occasion the pain I expected its pressure upon certain points would have done, for the patient had no occasion to complain of its hurting him. The patient was found on the second evening after it was reduced, busily engaged in assisting to extinguish a fire which broke out in the city, which shows there must have been little contusion.

Nor can I neglect to express the pleasure I feel in consequence of the approbation it has met with by the medical gentlemen present; but particularly my preceptor who had previously thought little of its utility.

In this case it became necessary to exercise the most prompt means, as the patient was very muscular, as the head was carried far out of the socket, and as his arm had not before been dislocated. But I am fully conscious reduction can frequently be accomplished in recent cases without some of the means here exerted; especially if it should be a case where luxation has frequently occurred. Indeed if the surgeon were at hand shortly after the disarray shall have taken place and were to take advantage of a state of swooning which not unfrequently supervenes the accident; he might accomplish reapposition by his own address, provided the patient shall be of a delicate structure. But I am sorry to say that instead of attending to this, which is of real importance, it is a general practice to use means for their recovery from the contingent and unimportant state of syncope.